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Analysis of Nutritional Content of Fresh Sea Worm Honingka *(Siphonosoma australe-australe)* as a Potential Food Source for Communities

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Abstract. Honingka worms (*Siphonosoma australe-australe*) can be found in the Wakatobi Islands, Southeast Sulawesi. Honingka worms have been used as food and traditional medicine. Honingka worms have never been tested in terms of nutritional content. This study aimed to determine the nutritional content of wet worms. This research was conducted at Testing Laboratory, Faculty of Fisheries and Marine Sciences Halu Oleo Kendari University from September to October 2017. This study was descriptive quantitative research. The data were analyzed through descriptive analysis. The results showed that the nutrient content average of wet Honingka was 17.3880% protein, 1.2766% lipid, 79.5928% water, 0.6408% ash, and crude fiber of 0.5798%. The results showed that these worms in fresh/wet portions can have high levels of protein, coarse fiber, and high-water content, low ash, and non-fat content. This study showed that the fresh/wet Honingka worm has potential as a food source for the community.

Keywords: Sea worm, *Siphonosoma australe-autrale*, source of food, nutritional content

1. Introduction

Indonesia is a maritime country with a tropical climate and has tens of thousands of islands. Indonesia is located between two continents namely Asia and Australia and two Pacific and Indian Oceans. Indonesia has an extraordinary diversity of marine biota ranging from marine fauna, algae, flora, to microbes [1]. However, the species richness of terrestrial biota is relatively more complete than the marine biota. In the Indonesian Biodiversity Strategy and Action Plan states that exploration and expedition are still very needed to reveal the existence and potential of Indonesian marine biota especially for Eastern Indonesia such as Sulawesi [2].

One of the islands in the province of Southeast Sulawesi (the eastern part of Indonesia) which is famous for having an area of the ocean is larger than the mainland is the Wakatobi Islands. Wakatobi Islands is an archipelago that has an area of 1,390,000 ha which consists of 97% of the oceans and 3% of land and is located in the "Coral Tri-Angle" center of the world's coral triangle. Geographical location, area, and a number of these islands make Wakatobi an archipelago that has a very high diversity of marine biota [3]. Various marine biota found in the Wakatobi islands include sea turtles, sponges, coral reefs, seagrasses, fish, and some marine biota from the Sipuncula phylum which provide benefits for the lives of the surrounding communities because some of them can be used as food, health, energy and provide ecosystem services whose functions are difficult to replace.

Communities in Indonesia know Sipuncula by the name of sea worms or peanut worms which are known to have potential that can be developed in the field of food. Sea worm type *Siphonosoma australe-australe* biota which is commonly called "Honingka" by the Sombu coastal community which extends to Wakatobi is a sea worm that has a large body shape about 12-35 cm long. These worms can be found in calm waters, muddy and sandy areas, non-permanent holes, snail shells, or gully [4].

Some research into the potential of sea worms as natural ingredients is carried out against futile sea worms (*Sipuncula* sp.) from Nalahia waters which stated that the worms had the highest protein content of 16.88-17.13% [5]. In China, sea worms are used as traditional medicine in treating turmeric disease, regulating the function of the stomach and spleen, and recovery of health caused by various pathogens [4]. Recent research conducted stated that *Sipunculus nudus* sea worms from Raja Ampat and Manokwari district waters had a chemical composition that was beneficial to the human body such as 82.46% protein.

The existing reality, there were many Honingka worms (*Siphonosoma australe-australe*) taken by the community by digging sand using a crowbar aid. Worm Honingka (*Siphonosoma australe-australe*) by the public is consumed as a variety of foods other than fish which are also believed to have health benefits. The nutritional content of sea worms in each water is different but has a fairly complete nutritional content so that it can be used as a functional food ingredient [6]. The nutrients found in sea worms are proteins, carbohydrates, fats, vitamins, and minerals that are almost equivalent to the nutritional content of fish. This study aims to analyze the nutrient content of wet and dry Honingka (*Siphonosoma australe-australe*) worm which has the potential as a food source for the Sombu Coastal community of Wakatobi Islands, Southeast Sulawesi.

2. Methods

This research was conducted at the Testing Laboratory, Faculty of Fisheries and Marine Sciences, Halu Oleo Kendari University from September to October 2017. The population in this study was Honingka worms (*Siphonosoma australe-australe*) that lived in the waters of the Sombu Coast, Wakatobi Regency, Southeast Sulawesi. The samples used in this study were the wet Honingka worms (*Siphonosoma australe-australe*) which was tested its nutritional content using a weight of 100 grams. The sampling technique used was a simple random sampling.

The variables analyzed in this study were nutrient content (moisture content, ash content, protein content, crude fiber content, and fat content) Honingka worms (*Siphonosoma australe-australe*) which were wet. Laboratory tests conducted in this study are by analyzing nutritional content using the proximate analysis method, then the data obtained is applied in the form of tables. The proximate analysis includes the test of water content, ash content and crude fiber by gravimetric method, fat content test using the Soxhlet method and protein content test using the Kjeldahl method.

The analysis used was descriptive analysis with the help of Microsoft Excel programs. Descriptive analysis was an analysis used to analyze data by describing or describing data that has been collected as it is without intervening and hypotheses. The quantitative data the analysis used was quantitative descriptive in the form of percentages and averages of the three replications displayed in the results in the form of graphs or tables.

3. Results and Discussion

Sea worms included in the Sipuncula Phylum of the Sipunculidea class were one of the marine biotas which until now have not been used optimally. The results of the field research showed that the *Siphonosoma australe australe* sea worm was an organism that lives in sandy areas that have seagrasses, their way of life by planting themselves in the sand at a depth of 20-70 cm from the bottom of the waters with salinity 31-33 ppt. How to eat the *Siphonosoma australe-australe* sea worm with a deposit feeder that is taking sand sediments around it as particles and utilizing nutrients that have settled for their survival. The *Siphonosoma australe-australe* sea worm has a unique shape with a length between 13-23.5 cm with a diameter between 1-2.5 cm with light brown color.

Honingka worm samples (*Siphonosoma australe-australe*) used in this study were obtained from Sombu Waters, Wakatobi Regency, Southeast Sulawesi. Honingka Worm (*Siphonosoma australe-australe*) is an organism that lives in the sea in sandy areas that have seagrasses and life by immersing themselves in the substrate at a depth of 20-70 cm from the bottom of the water. Lives in silty sediment from the intertidal zone to a dept of 600 m. Burrows is more than 50 cm in depth [7]. The Honingka worm (*Siphonosoma australe-australe*) used in this study can be seen in Figure 1.

Taxonomy of *Siphonosoma australe-australe*
Phylum: Sipuncula
Class: Sipunculidae Cutler & Gibbs
Family: Sipunculidae Rafinesque
Species: *Siphonosoma austral-australe* [8].

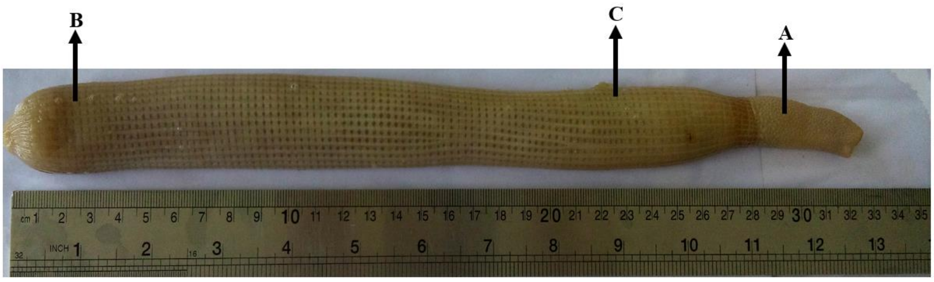

Figure 1. *Siphonosoma australe-australe* (A: Trunk (introvert) in the anterior part, B: The main body (trunk) in the posterior part and C: Anus (Source: Personal Documentation, 2017)

Based on the results of the proximate analysis, it can be known the protein, fat, ash, water content and crude fiber content in Honingka worms (*Siphonosoma australe-australe*). These results are listed in Table 1. Stated that nutrients are grouped into 6 major groups, namely carbohydrates, proteins, fats, vitamins, minerals, and water [9]. Nutrition is the chemical elements needed by the body to perform its function in generating energy, maintaining, building and repairing body tissues [10]. The protein content of Honingka worms (*Siphonosoma australe-australe*) obtained in this study was high compared to Kekuak (*Sipunculus nudus*) sea worms from Bangka waters namely 10.61% wet Kekuak. States that the organic matter content of an organism was influenced by place of life, substrate, water quality, type of food, and body size [11].

Table 1. Nutritional Content of Honingka Worms (*Siphonosoma australe-australe*) Wet

Contents (%)	Honingka Worms Wet
Protein levels	17.3880 ± SD 0.9250
Fat levels	1.2766 ± SD 0.2870
Water levels	79.5928 ± SD 0.4235
Ash levels	0.6408 ± SD 0.0233
Coarse fiber levels	0.5798 ± SD 0.0437

3.1. Protein Levels

Protein is an essential ingredient in forming body cells and tissues [12]. The high level of protein in Honingka worms (*Siphonosoma australe-australe*) is thought to be due to a large amount of sediment deposited in the Honingka worm habitat (*Siphonosoma australe-australe*). The existence of these sediments will benefit the worms as a source of food. Stated that the difference in protein content of an organism was due to the processing carried out, the type of food, the size of the body and the different levels of water levels that differed from each type of animal. Honingka worm (*Siphonosoma australe-*

australe) has a high protein content because the worm uses sediment as its food source. That protein, carbohydrates, and fats are organic materials deposited in sediments. Explained that differences in protein content of meat from an organism are influenced by the nature of unstable proteins. The higher the water content, the lower the protein content [13]. Amino worms consist of 2 types of acids, namely essential amino acids and non-essential amino acids consisting of 15 sub-indicators of amino acids [14]. State that essential amino acids can determine protein quality [15].

3.2. Fat Levels
Fat content in Honingka worms (*Siphonosoma australe-australe*) every 10 grams in the wet sample is 1.2766%. Based on the results of the study fat content of sea worm waters is 0.18% [16]. There are variations in the value of fat content of sea worm meat is influenced by water content, habitat, size and nutrition [17]. The difference in the fat content of sea worm meat is influenced by water content, habitat, size and nutrition [18]. The nutrient content in a sea organism varies depending on nutrition, age, sex, and species [19]. Sea worms contain 12 saturated fatty acids, 5 monounsaturated fatty acids, and 13 polyunsaturated fatty acids [20].

3.3. Water Levels
Based on the results of the analysis of the water content of Honingka worms (*Sipunculus nudus*) on 10 grams of the wet sample was 79.5928%. The results of research where the water content in Sipuncula type *Xenosiphon* sp. was 76.47% wet [21]. Stated that water content has an inverse relationship with fat, the lower the fat, the higher the water content in an organism [22]. Marine organisms adapt to osmoregulation by drinking as much sea water as possible and releasing a little urine to keep the body condition isotonic. Differences in water content can be caused by type, the age of biota, and differences in environmental conditions. The higher the water content produced by a product, the quicker the product gets damaged [23].

3.4. Ash Levels
The ash content of an organism describes the mineral content of the organism [24]. Based on the results of ash content analysis on Honingka worms (*Siphonosoma australe-australe*) every 5 grams of the sample on a wet sample is 0.6408%. The studies explain the high and low levels of ash can be caused by different types of organisms [25,26]. Each organism has different abilities in regulating and absorbing minerals, so it would affect the ash content in each ingredient. Ash content is a material that describes the number of minerals that do not burn into substances that can evaporate, the greater the ash content of an organism shows the higher the minerals contained in which the sandy substrate significantly affects the ash content [27].

The substrate significantly affects the ash content of sea worms [28]. The ash content of an organism is influenced by differences in habitat, eating habits, and the environment in which it lives [29]. The sand substrate at the bottom of the waters contains various minerals. Honingka sea worm (*Siphonosoma australe-australe*) is a deposit feeder, which is to eat all the deposits contained on the substrate. Sand substrate Eastern Indonesia is rich in iron, magnesium, calcium, sodium, phosphorus and other minerals [30]. The determination of ash content was carried out to determine the content of metal oxides in the material [29]. Ash content is assumed to be the remaining mineral left behind when burned because natural materials not only contain carbon compounds but also contain several minerals, where some of these minerals have been lost during carbonization and activation, some are thought to remain in the material [1].

3.5. Coarse Fiber Levels
Based on the results of the rough fiber analysis of the Honingka worm (*Sipunculus nudus*) at 4 grams of the sample on the wet sample, the wet sample was 0.5798%. Carbohydrates in food consist of crude fiber and extract ingredients without nitrogen, high crude fiber content in food would affect digestibility and absorption in the digestive device. The nutritional content of Honingka worms can be

equated, even compared to the nutritional content of fish commonly consumed by Indonesian people in general, such as milkfish (*Chanos chanos*). Comparison of the nutritional content of Honingka worms (*Siphonosoma australe-australe*) with milkfish (*Chanos chanos*) is shown in Table 2. Based on the range of fish nutrition, fish have a high nutritional content including 15-24% protein, 1-3% carbohydrates, 0.8-2% organic substances, and 66-84% water. That the nutrient content in an organism varies depending on nutrition, age, sex and species [31].

Table 2. Comparison of Nutritional Content of Honingka Worms (*Siphonosoma australe-australe*) with Fish Often Consumed by the Community, namely Bandeng fish (*Chanos chanos*).

Nutrient content	**Wet-condition (%)**	
	Honingka Worm (*Siphonosoma australe-australe*)	**Bandeng Fish (*Chanos chanos*)**
Protein	17.3880	12.45
Fat	1.2766	1.08
Water	79.5928	77.54
Ash	0.6408	1.55
Coarse fiber	0.5798	7.38

Thus, the nutritional content of Honingka worms (*Siphonosoma australe-australe*) results of this study (portion of edible, fresh / wet) can be categorized as having high levels of protein, crude fiber, and water content, low ash content and non-fat. Accordingly, the Honingka worm (*Siphonosoma australe-australe*) can be used by the Sombu Coastal community of Wakatobi Islands as a source of food even more so with the condition of Indonesia which still low consumption of animal protein Honingka worms (*Siphonosoma australe-australe*) can be used as an alternative source of animal protein to meet consumption nutrition and utilization of natural resources that are not optimal. Sea worms have a relatively complete nutritional content so that they can be used as functional food ingredients [32]. Nutrient content contained in sea worms namely protein, fat, carbohydrates, ash, fatty acids, and amino acids, vitamins A, B1, B6, B12, E, and minerals P, I2, Ca, Mg, C [1].

4. Conclusion

Nutrient content in Honingka worms (*Siphonosoma australe-australe*) in Sombu waters in Wakatobi Regency showed the proportion of wet sea worms protein content of 17.3880%, 1.2766% fat content, 79.5928% moisture content, 0.6408% ash content, and 0.5798% crude fiber content. This worm (the portion of edible, fresh/ wet) can be categorized as having high levels of protein, crude fiber, and water content, low ash content and non-fat, so this worm has the potential as a source of food, especially protein sources for the Sombu coastal community of Wakatobi Islands.

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